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A new *Lepidospora* species from Xizang, China (Zygentoma: Nicoletiidae: Coletiniinae)

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Abstract: A new species of the genus *Lepidospora* Escherich, 1905, *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.**, is described based on one female specimen collected from Xizang, China. This new species is characterized by the following features: (1) ovipositor relatively long, gonapophyses each with 24–25 divisions; (2) scales on head and legs rounded and smaller than those on thorax and abdomen; (3) maxillary palp with ultimate article nearly as long as penultimate article, L/W = 3.3; (4) urotergite X bearing 1+1 long non-bifurcate macrochaetae on postero-lateral corners, and 8+8 stout setae along posterior margin.

Keywords: Qinghai-Tibet Plateau, silverfish, taxonomy, Thysanura

中国西藏多刺土衣鱼属一新种（衣鱼目：土衣鱼科：真土衣鱼亚科）

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摘要：基于在中国西藏采集到的一枚雌性标本，本文描述了多刺土衣鱼属 *Lepidospora* Escherich, 1905 一新种——史氏多刺土衣鱼 *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.**。该新种的主要鉴别特征如下：(1) 产卵器较长，生殖突 24–25 节；(2) 头部和足上的鳞片圆钝，小于胸部和腹部的鳞片；(3) 下颚须末节长度与倒数第二节相近，长宽比为 3.3；(4) 腹背板 X 侧后角具 1+1 长的无分叉大毛，后缘具 8+8 粗刚毛。

关键词：青藏高原，衣鱼，分类，缨尾类

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Introduction

Escherich (1905) established the genus *Lepidospora* Escherich and described two species: *L. braueri* Escherich, 1905 from the Seychelles, and *L. gracilis* Escherich, 1905 from Sumatra. The former was later designated as the type species by Paclt (1963). In the same work, Escherich noted that the species described as *Nicoletia phytophila* Gervais, 1844 by Grassi & Rovelli (1889) from Sicily represented a distinct species, which he renamed as *N. grassii* Escherich, 1905. Wygodzinsky (1980) transferred this species to *Lepidospora* based solely on body shape as depicted in the original illustrations.

Mendes (2002a) presented a key to *Lepidospora* species, in which he accepted *Brinckina* Wygodzinsky, 1955 as a subgenus of *Lepidospora*; besides, he excluded *L. gracilis* and *L. grassii* in this key for the reason of insufficient description.

Kaplin (2012) provided an updated key to *Lepidospora*, but because he did not treat *Brinckina* as a subgenus within *Lepidospora*, his key included only 24 *Lepidospora* s.s. species (excluding *L. gracilis* and *L. grassii*, following Mendes 2002a), and *L. ayyalonica* Mendes et al., 2011 was omitted probably because of the publication time of the article. With the addition of *L. mazyadi* Espinasa & Mendes, 2013, the subgenus *Lepidospora* s.s. should currently comprise 28 valid species (including two questionable species: *L. gracilis* and *L. grassii*), widely distributed in Afrotropic, Indomalaya, and west part of Palaearctic (Mediterranean region and Arabian Peninsula).

Material and methods

The specimen was dissected and mounted on one slide after photographing. The holotype is deposited in the State Key Laboratory of Agricultural and Forestry Biosecurity, College of Plant Protection, Fujian Agriculture and Forestry University (**FAFU**).

The specimen was examined using a Nikon SMZ18 stereomicroscope. Microphotographs were captured with a computer-connected Nikon imaging system comprising a Nikon Eclipse Ci-L upright microscope, a 16 MP digital camera with a 0.55× adapter, and NIS-Elements D software (version 4.60.00). All images were processed using Adobe Photoshop 2023.

Roman numerals are used to indicate abdominal segments. H+B: head and body (thorax and abdomen) length, from the anterior margin of clypeus to the posterior margin of urotergite X (excluding the macrochaetae); L/W: length to width ratio; PI, PII, PIII: legs of pro-, meso- and metathorax respectively. Terminology for the seta type and for the "segments" of the antennae, terminal filaments and ovipositor follows that explained in Smith (2015). Some of the macrochaetae have been broken, and in this case, their number is counted based on the fracture marks.

Taxonomy

Lepidospora (*Lepidospora*) *smithi* sp. nov. 史氏多刺土衣鱼

https://zoobank.org/A03849CB-E272-4D0A-8057-FF73F02135F9

Figs 1–34

Type material. ***Holotype*:** female, CHINA, Xizang, Bomi County, south of Galang Village [西藏波密县嘎朗村南部] (29.912028N, 95.625344E, elev. 2690 m) [WGS84], 28.VIII.2023, leg. P.-X. Mu; on one slide; FAFU.

Diagnosis. This new species belongs to Nicoletiinae s.l. sensu Smith (1998) based on its elongate body shape. It can be placed in the subfamily Coletiniinae sensu Mendes (1988) due to the divided urosternite I and entire urosternites II–VII. The species is assigned to the genus *Lepidospora* Escherich, 1905 based on the following characters: (1) empodium present and claw-like (absent in *Pseudobrinckina* Mendes, 2002b and *Allobrinckina* Kaplin, 2019); (2) abdominal styli eight pairs, present on urosternites II–IX (seven pairs in *Lepidina* Silvestri, 1949); (3) scales present at least on abdomen (completely absent in *Coletinia* Wygodzinsky, 1980); (4) most scales typical

in form (modified in *Squamatinia* Mendes & Reboleira in Reboleira et al., 2012). It is further classified in the subgenus *Lepidospora* s.s. due to the presence of scales on both the head and thorax (absent on head in *Brinckina* Wygodzinsky, 1955 and absent on both head and thorax in *Brinckiletinia* Molero, Tahami, Gaju & Sadeghi in Tahami et al., 2018).

This new species can be distinguished from other *Lepidospora* s.s. species by the combination of characters: (1) ovipositor relatively long, gonapophyses with 24–25 divisions, part of posterior gonapophyses projecting beyond apices of styli of urosternite IX ca 1.9 times as long as styli.; (2) scales on thorax and abdomen larger than those on head and legs, the former with 13–17 ribs whose ends slightly surpassing outer margins, while the latter with 7–11 ribs whose ends not surpassing outer margins; (3) ultimate article of maxillary palp nearly as long as penultimate article, L/W = 3.3; (4) urotergite X with 1+1 long non-bifurcate macrochaetae on postero-lateral corners, length longer than half of urotergite X, posterior margin with 8+8 stout setae.

Among known species, *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.** is most similar to *L.* (*L.*) *notabilis* Silvestri, 1913, a species known only from the male with the type locality in Myanmar. The two species share notable similarities in the structure of the maxillary and labial palps and the legs. However, the third article of the maxillary palp of *L.* (*L.*) *notabilis* bears a distinct comb of setae on the internal surface, a character absent in *L.* (*L.*) *smithi* **sp. nov.**; additionally, character (2) described above was not mentioned in the original description of *L.* (*L.*) *notabilis*.

Description of female. *Measurement*. H+B 9.5 mm; maximum paracercum length 4.6 mm, maximum cerci length 4.7 mm; antennae length 5.6 mm; head length 1.3 mm, width 1.4 mm.

Coloration. General body color uniformly pale yellowish in ethanol.

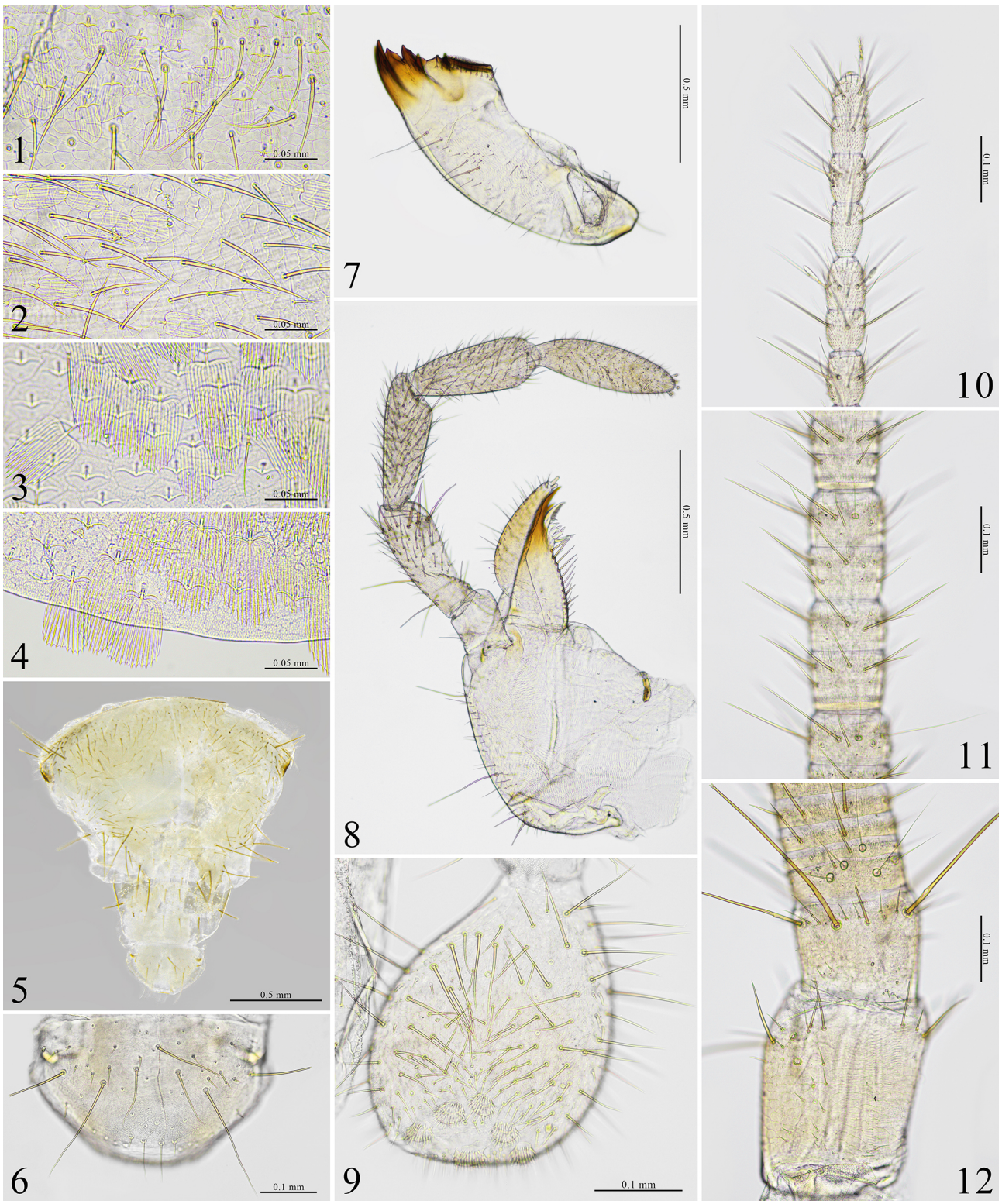
Scales (Figs 1–4). Transparent, colorless, hardly visible in ethanol under stereoscope. Present on head capsule, thoracic nota and sternites, basal part of dorsal surfaces of coxae and femora, urotergites, and urosternites. Those on thorax and abdomen larger than those on head and legs, the former with 13–17 ribs whose ends slightly surpassing outer margins, whereas the latter with 7–11 ribs whose ends not surpassing outer margins.

Macrochaetae. Long, smooth, relatively fine, each with or without a bifurcate tip.

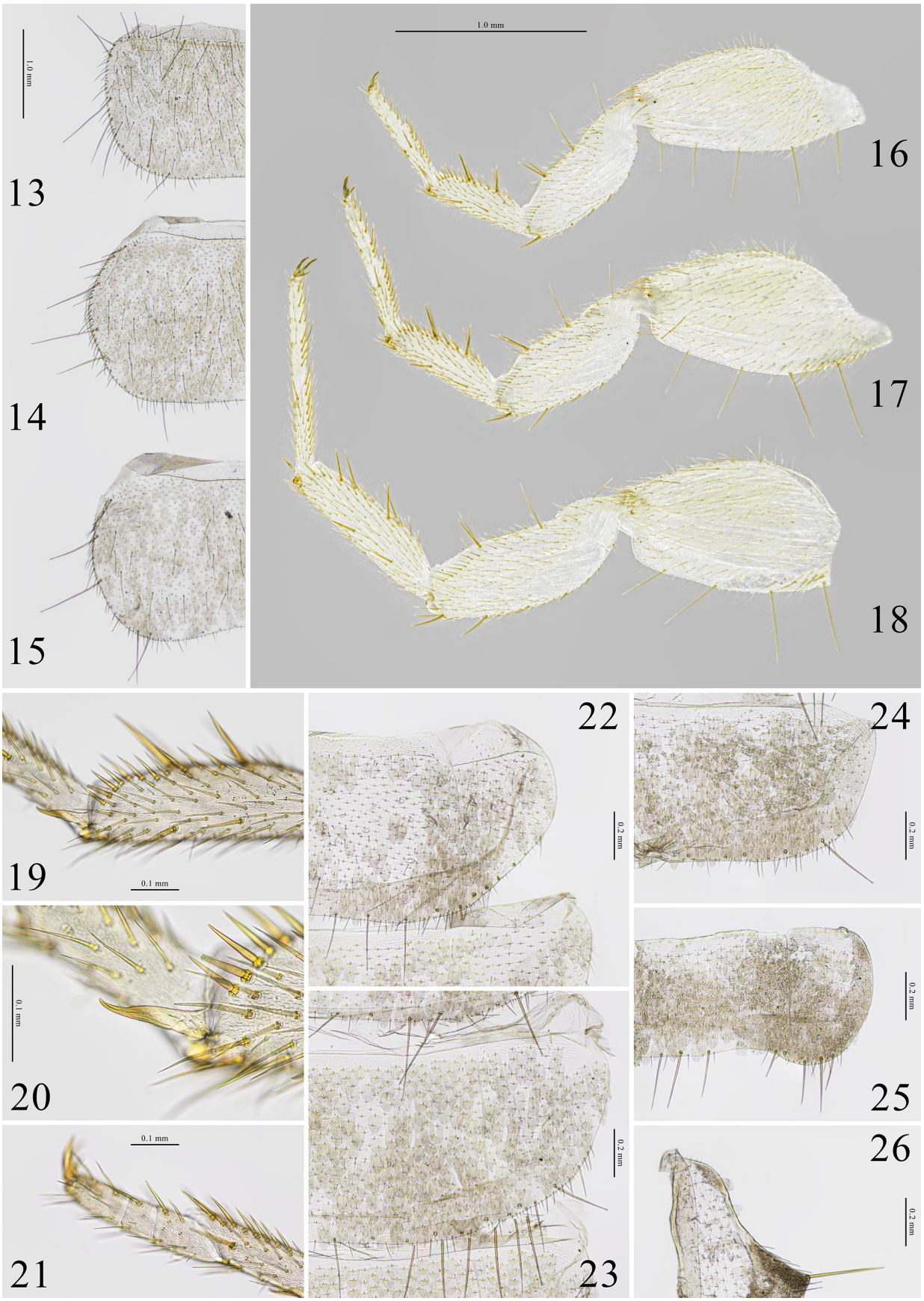
Head capsule (Fig. 5). Almost as long as wide, hind margin not covered by pronotum. Vertex with 2+3 bifurcate macrochaetae in postero-lateral corners as well as some smaller setae; antero-lateral corners adjacent to antennal bases with 7+7 macrochaetae (most apically bifurcate); disc scattered with numerous small fine setae. — Clypeus with 2 transverse rows of setae, basal row with 1+1 relatively short bifurcate macrochaetae, and distal row with 2+2 lateral longer bifurcate macrochaetae and 1+1 median smaller setae.

Mouthparts. Chaetotaxy of labrum from base to distal edge as following (Fig. 6): single median bifurcate macrochaeta, 1+1 submedian bifurcate non-bifurcate macrochaetae, 1+1 lateral bifurcate macrochaetae, 1+1 longer sublateral non-bifurcate macrochaetae, and 2+2 short median setae (inner pair longer than outer pair). — Mandibles (Fig. 7) with one bifurcate macrochaeta and three non-bifurcate macrochaetae on dorsal surface near outer margin, and with one bifurcate macrochaeta at base. — Maxillae (Fig. 8) of usual form, galea with two distinct sensory cones apically, lacinia well sclerotised with one strong apical tooth and a secondary tooth; length ratio of articles of maxillary palp from base to apex = 0.5:1.0:1.0:1.0:1.1; ultimate article with six cylindrical sensillae apically, L/W = 3.3. — Labium (Fig. 9) longer than wide; length ratio of articles of labial palp from base to apex = 1.2:1.0:1.3; ultimate article with six papillae of usual type, L/W = 1.3.

Antennae (Figs 10–12). Elongated, longer than half of H+B. Scape longer than wide, and nearly twice as long as pedicel, with several strong bifurcate or non-bifurcate macrochaetae distally. Pedicel without apophyses, with several bifurcate macrochaetae distally, distinctly longer than those of scape. Flagellum with four trichobothria on the basal annulus; basiconic sensilla present from fifth annulus and more abundant on middle part of flagellum; distal annulus of penultimate interval with two large capitate peg sensilla.



FIGURES 1–12. *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.**: **1** scales on vertex **2** scales on coxa of PI **3** scales on urotergite III **4** scales on urosternite I **5** head capsule **6** labrum **7** mandible **8** maxilla **9** ultimate article of labial palp **10** apical part of flagellum **11** middle part of flagellum **12** scape, pedicel and basal part of flagellum..



FIGURES 13–26. *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.**: **13** pronotum **14** mesonotum **15** metanotum **16** PI **17** PII **18** PIII **19** tibia of PI **20** distal spur on tibia of PI **21** tarsus of PI **22** urotergite I **23** urotergite V **24** urotergite VIII **25** urotergite IX **26** urotergite X.

Thorax (Figs 13–15). Length about 1/4 of H+B, and not wider than abdomen. Pronotum shorter than remaining nota, and mesonotum longer than metanotum. Pronotum with 10+9 long bifurcate macrochaetae on anterior margin and antero-lateral corners, and with 2+3 similar macrochaetae on lateral margins. Meso- and metanotum without macrochaetae along anterior margins, with 4–5 long bifurcate macrochaetae on each lateral margin. All nota with numerous shorter setae and setulae on discs and margins.

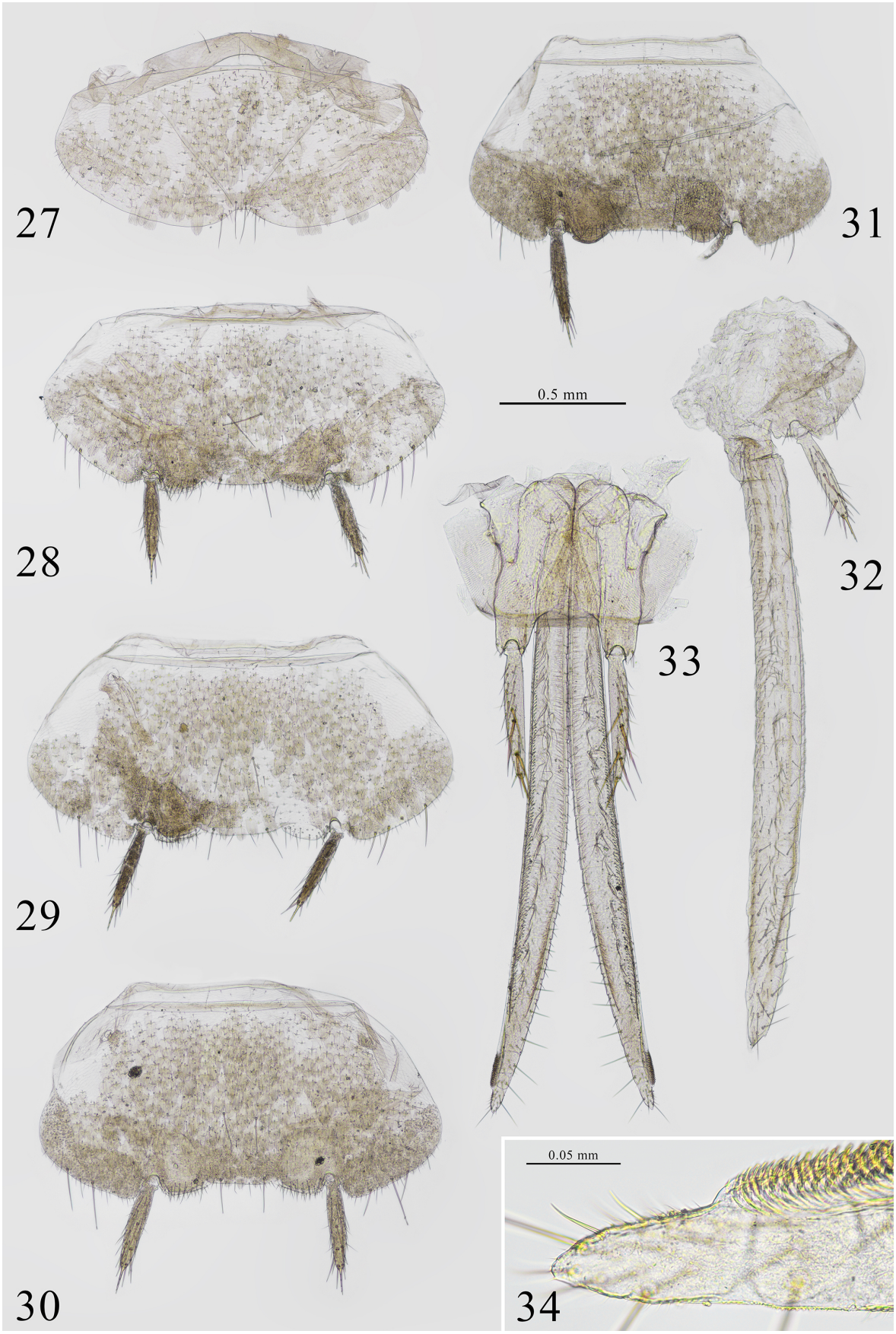
Legs (Figs 16–21). Typical for genus. L/W of each tibia: PI 3.3, PII 3.5, PIII 3.8; L/W of each tarsus: PI 6.2, PII 7.6, PIII 10.5. PII longer than PI, and PIII longer than PII; length ratio of tibiae of PI:PII:PIII = 1.0:1.2:1.7; length ratio of tarsi of PI:PII:PIII = 1.0:1.2:1.8. — Coxa with 4–5 long bifurcate macrochaetae along outer margin, with smaller and denser bifurcate macrochaetae distally, margins and dorsal surface scattered with fine setae; coxae of PII and PIII each with a dorso-basal region near outer margin which with short, dense macrochaetae. — Trochanter with one bifurcate macrochaeta and several smaller setae along inner margin, with one short non-bifurcate macrochaeta on outer margin. — Femur with six stout non-bifurcate macrochaetae along outer margin, becoming longer distally; inner margin with one macrochaeta proximally and pair of macrochaetae on distal bulge; dorsal surface with numerous smaller setae, and with a regular row of fine setae distally; ventral surface mostly bare, except with row of setae along inner margin. — Tibia with two pairs of stout non-bifurcate macrochaetae on inner margin, located at approximately one-third and two-thirds of distance from base, respectively; dorsal surface with a regular row of stout shorter setae near inner margin, with two stout non-bifurcate macrochaetae near outer margin; distal spur with three subapical teeth. — Tarsus with four articles, length of basal one nearly as long as other three together on all legs, each article with 1–7 paired stout setae along inner margin depending on length of article. — Pretarsus with two strong claws and a stout claw-like empodium.

Urotergites (Figs 22–26). Sutures between tergite and paratergites visible on urotergites I–IX. Paratergites I–VII and VIII–IX on each side with four and three posterior long macrochaetae respectively. Tergites I–VIII on each side with five or six posterior long macrochaetae. Tergite IX with pair of submedian concavities on posterior margin, and on each side with two long macrochaetae laterad of submedian concavity and with three long macrochaetae mediad of submedian concavity. Urotergite X trapezoidal, postero-median concavity not wide, no pegs present; postero-lateral corners with 1+1 long non-bifurcate macrochaetae, length longer than half of urotergite X; posterior margin on each side with eight stout setae, five laterad of long macrochaetae and three mediad of long macrochaetae. Discs of all urotergites with very few scattered setulae.

Urosternites (Figs 27–31). Styli present on urosternites II–IX, apical spine of each stylus with 3–4 barbs; urosternites II–VI with 1+1 eversible vesicles, and urosternite VII with 1+1 pseudovesicles. Urosternite I divided into a median sternum and two lateral coxites; sternum with few setulae on disc, posterior margin with 1+1 submarginal long setae as well as some tiny setulae near margin; posterior margin of coxites each with one long seta near suture with sternum, as well as some setulae. Urosternites II–VII each with 1+1 submedian bifurcate macrochaetae near middle of disc; posterior margin with 1+1 submedian bifurcate macrochaetae, with 1+1 bifurcate macrochaetae mediad of base of each stylus, with 3–5 macrochaetae sublaterally (rarely bifurcate apically). Subgenital plate rounded subtriangular, with several long subapical setae dorsally, and with shorter marginal setae and setulae. Urosternites VIII–IX divided into separate coxites; posterior margin of coxites VIII each with two sublateral macrochaetae and one macrochaetae mediad of base of each stylus, as well as several setulae; posterior margin of coxites IX each with two inner and one outer non-bifurcate macrochaetae near base of each stylus.

Ovipositor (Figs 32–34). Relatively long and slender, L/W 12.3–14.2, length slightly longer than 1/4 of H+B. Gonapophyses with 24–25 divisions. Part of posterior gonapophyses projecting beyond apices of styli of urosternites IX ca 1.9 times as long as styli. Apex of anterior gonapophysis with a typical acute triangular projection. Posterior gonapophysis rounded apically, with typical region of hooked processes on penultimate division.

Caudal filaments. Incomplete. No pegs present. Long bifurcate macrochaetae present from third division in paracercum and from fourth division in cerci.



FIGURES 27–34. *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.**: **27** urosternite I **28** urosternite II **29** urosternite IV **30** urosternite VI **31** urosternite VII **32** coxite VIII and anterior gonapophysis **33** coxites IX and posterior gonapophyses **34** apex of posterior gonapophysis enlarged.

Habitat. The specimen was found under a small stone in an artificial grove next to the China National Highway 318. The area receives approximately 900–970 mm of rainfall annually, and the soil was relatively moist when the sample was collected.

Etymology. This new species is named after Dr. Graeme B. Smith (Australian Museum), who made significant contributions to the systematics of Zygentoma and provided crucial assistance to this study.

Distribution. China: Xizang (Bomi County).

Remarks. The scales of *Lepidospora* (*Lepidospora*) *smithi* **sp. nov.** show a distinct regional heterogeneity, namely those scales on head and legs are smaller than those on thorax and abdomen; moreover, the former have rounded margins and inconspicuous rays, while the latter with conspicuous rays surpassing the margins. These smaller rounded scales with inconspicuous rays on the head and legs, possibly represent a derived reduction. It is worth noting that such scales are somewhat similar with those of *Squamatinia* Mendes & Reboleira, a monotypic genus from Portugal (Reboleira et al. 2012).

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Additional information

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Photo Gallery

秘境缘刺蝽 *Pericentrus cryptopetalus* Gao & Wu, 2026
Mêdog, Nyingchi, Xizang
photograph by Peng-Xu MU [穆鹏旭]